Avionics/Intelligence and Electronic Warfare Bulletin

"Serving the Needs of the Army's A/IEW Community"

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SEC Decreases Cost of Guardrail Common Sensor Systems Through the Processor Re-Host Effort

SEC, building upon previous technological strides of the PM Aerial Common Sensor (ACS), has accomplished an important upgrade to a legacy system that will save the Government substantial amounts of money in hardware, operational, training and support costs.

The challenge posed to SEC was far from simple - re-host the existing Guardrail Electronic Intelligence (ELINT) System Computer Maxion (ESM) software to a less expensive hardware platform, pre-existing in Government inventory, that could still provide robustness, ease of maintainability, POSIX compliance, and user/programmer familiarity. The reason for the challenge - the existing legacy platform required specialized knowledge for maintenance and support, and was fast becoming outdated. Technological advancements, which have decreased the space, weight and power needs of hardware, were quickly rendering the existing platform almost obsolete.

In This Issue

SEC met this challenge by building upon previous upgrades that were achieved in a rehost effort funded by the PM ACS, which targeted the Micro V computer system. This initial effort included rehosting the Communications Intelligence (COMINT) Main System Computer (MSC) and ELINT System Computer (ESC) software from the bulky and expensive Micro V hardware to the Concurrent Corporation's Maxion Computer, known as the ESM and the Main System Computer Maxion (MSM). Converting from the Micro V's unique OS32 operating system to a UNIX-based operating system proved to be a difficult and expensive task.

As part of the Government's Dual Use Application Program (DUAP), PM ACS enlisted the financial help of the private sector and, in return, allowed the contractor to retain all tools developed in the process for resale.

This initial effort included porting over 150,000 lines of code and laid the groundwork for SEC to further lower operational

(cont'd page 3)

The "Avionics/Intelligence and Electronic Warfare Bulletin" is a quarterly professional periodical published by the CECOM SEC Avionics/Intelligence and Electronic Warfare Division

From the Senior Editor's Desk

Written by Mr. Joseph Ingrao, A/IEW Division Chief

Mission Statements

Organizations that have a clear and strong vision or mission statement tend to outperform their rivals. Put another way, the most successful and profitable organizations have a much stronger vision than their competitors. The more visionary organizations I have dealt with have been able to "more thoroughly indoctrinate employees into a core ideology". The visionary organizations more carefully nurture and select senior leadership.

A good mission statement stresses elements like the importance of integrity, respect for the individual employee, service to the customer and responsibility to the community. However, not surprisingly, each mission is unique and there is no one element that is explicitly contained in every statement. What is common is authenticity of the ideology, that is, the extent to which the organization's actions are consistent with what it claims in its mission statement. We feel that these organizations have higher ethical and spiritual ideals. The resulting climate then attracts like-spirited people to the organization.

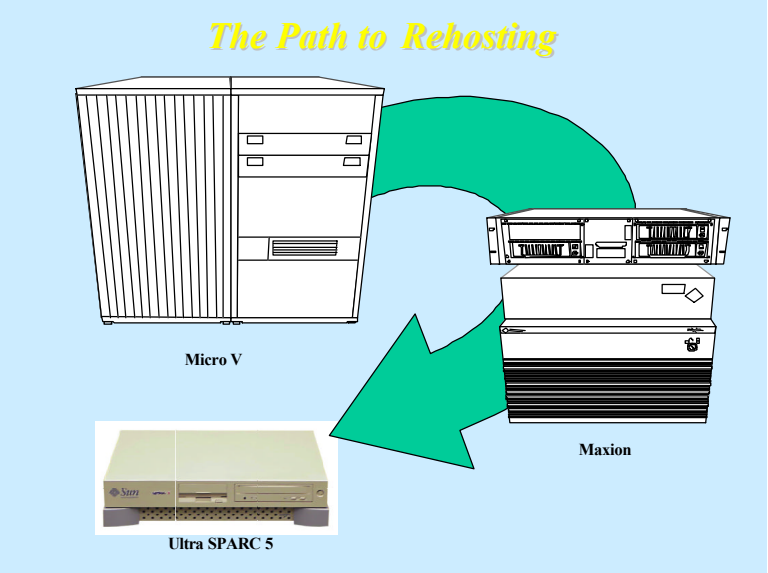
We in the A/IEW Division have embraced a mission statement that I feel provides a foundation to supporting our customers and ultimately the solider in the field. As part of my job I have attempted to convey that everyone's efforts are important whether that person is the project leader or the junior engineer. It is only with the efforts of every single individual on the team that we can rise above the obstacles, whatever they may be, and provide the best product to the Warfighter.

"Our Success Will Arise
From Simplicity
Our Objective Must Be To
Build Excellent Solutions
Quickly
Not Perfect Solutions
Eventually"

Rehost (cont'd)

costs and increase savings by rehosting the ESM software to Sun Microsystem's Ultra SPARC 60 with a Solaris 2.7 UNIX operating system. SEC discovered, during this rehost effort, that the ESM software could execute more desirably on the SPARC Ultra 5. The rehost to the Ultra 5, which already exists in the Army inventory, provided no loss in performance and less cost to the customer.

The SPARC Ultra 5, at $5K, is much more cost effective than the Maxion Computer with a hardware cost of $150K. The Sun SPARC Ultra 5 components are readily available and can be procured from a variety of vendors as opposed to the Maxion, which is produced by the Concurrent Corporation and offers a very limited number of vendors. The Ultra 5 reduces weight, space and power requirements and maintenance and training costs are reduced as the Army has already installed and tested systems in the field that utilize the Solaris operating systems on SPARC 20s, SPARC 1000/4000s and Ultra 5s.



SEC completed the ESC to SPARC re-host effort at a cost of approximately $305K, which included the cost of hardware and the initial set of compilers. The task took only five months to complete and was successfully flight-tested in March and August of 2000.

SEC has also completed the initial re-host of the MSM software from the Maxion hardware to a SPARC/Solaris configuration. SEC will be ready to begin flight tests in February 2001 and plans to complete the MSM software re-host by the end of summer 2001. To realize costs savings in both development and sustainment, the SPARC-based ESC has been selected as the solution for the newest ELINT subsystem, and has been funded by PM ACS for use in GRCS System 4. As SEC's development efforts gain momentum, the Government stands to save significantly well into the future, while enjoying increased software and hardware quality and performance.

Written by Mr. Rene Franco, SEC, Guardrail Branch

Army Communications-Electronics Command (CECOM) Software Engineering Center (SEC) Intelligence Fusion Systems (IFS) Depot Support

This article is the first of several that will detail CECOM SEC IFS Depot support.

Introduction

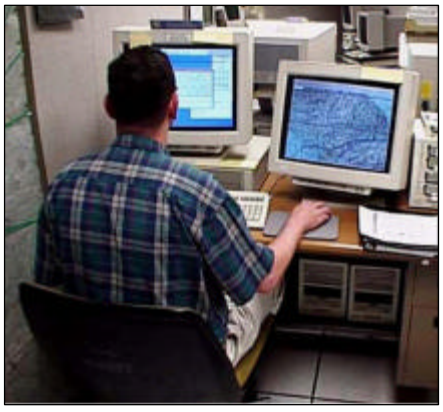
The U.S. Army CECOM SEC IFS ensures that all fielded Military Intelligence (MI) software systems are the best in the world. During the past four years, CECOM SEC IFS has developed software, made modifications and enhancements, tested, documented, and provided Configuration Management (CM) for 43 versions of the U.S. Army's All Source Analysis Systems (ASAS) family of systems, Digital Topographic Support System (DTSS), and Integrated Meteorological System (IMETS) software.

The mission of CECOM SEC IFS Depot is to provide support from initial programming development through document release. In addition, it provides continual update support to each software version. The CECOM SEC IFS Depot Operations' professional staff comprises more than 300 technical personnel who are proficient in Open Virtual Memory System (OpenVMS) and Solaris Operating Systems (OS), Oracle and Informix Database Management Systems (DBMS), C, C++, Pascal, FORTRAN, Ada, and 11 distinct scripting languages. The Software Engineering staff represents hundreds of man-years of software development and on-site support experience.

Depot Software Maintenance

The CECOM SEC IFS Depot Software Maintenance process is based on the complementary roles of Field Software Service Support (FSSS) Engineers serving as on-site system level trouble-shooters and the Depot Software Engineers' responsibility for system software anomaly resolutions and enhancements.

The Depot Software Maintenance process begins with the system user in the field. If a user-identified system anomaly cannot be resolved in the field by the FSSS Engineers, or there is a change in mission requirements that dictate an addition or enhancement to the capabilities of the ASAS family of systems applications, DTSS, and IMETS, a Software Problem Report (SPR) is initiated.



Once the SPR is entered into the depot-level SPR database, the software anomaly or enhancement addressed by the SPR is assigned to a Software Engineer for verification and a triage-type assessment of the time required to resolve, integrate, and test. The Software Engineer verifies the problem condition or, in the case of an enhancement, verifies that the capability does not currently exist on the system and proposes a design for resolving the problem statement.

Supporting the ASAS systems is the Engineering Support Team that encompasses Security Engineering, Test, Quality Assurance (QA), CM, and the User Development Group (UDG).

Security Engineering

The Security Engineering Team provides system security engineering and Command and Control Protect (C2P)/Information Assurance (IA) support to the fielded systems and the infrastructure classified and unclassified networks. They help to ensure the systems are in compliance with Department of Defense (DoD)/Army/Major Command (MACOM)/Program Executive Officer (PEO)/Program Manager (PM) system security policies and regulations. The Security Engineering Team monitors and coordinates Army Computer Emergency Response Team (ACERT) security alerts and bulletins, evaluates Commercial-Off-The-Shelf (COTS)/Government-Off-The-Shelf (GOTS)/public domain security tools for potential use, and conducts technical security testing.

Test

The code subsequently undergoes rigorous integration testing prior to undergoing a full functional test. The Test Group's mission is to provide user-functional testing of each of the CECOM supported systems. It accomplishes this mission by verifying that Technical Bulletins (TB) issued for fielded systems are correct and meet the requirements. It also validates version fixes during release testing. The Test Group has the responsibility of ensuring that the software performs the way it is supposed to, identifying any deficiencies, and bringing them to the attention of the engineers. If these deficiencies can't be readily fixed, an SPR is generated.

Quality Assurance

The mission of assessing whether or not a software product conforms to CECOM's established technical criteria belongs to the QA Team. They are involved with all Software Engineering and Engineering Support Teams from the beginning of the processes to ensure CECOM SEC IFS' process improvement efforts are successful. The QA Specialists also conduct independent reviews and audits of software products to ensure compliance with engineering and contractual requirements and conduct independent evaluations and audits of software processes to validate that Software Engineering Teams follow established software management plans and operational procedures.

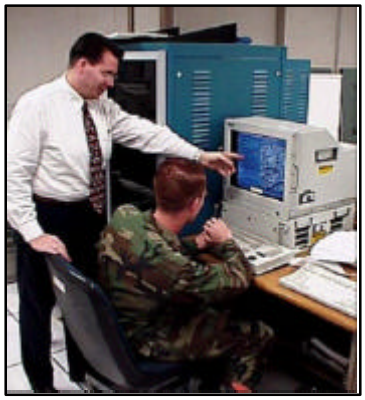
Configuration Management

Once unit-level testing has been successfully completed, the code is processed into the CM-controlled development baseline for successful integration. This is accomplished by the CM group completing a full system-level integration build of the code. CM provides guidance upon completion of the SPR, tracks FSSS scripts submitted from sites, updates the SPR database and provides reports to the System Manager and other team members. The CM group also controls software changes via the use of version control software, performs software builds/control baselines, and prepares version release distribution media and Version Description Documents (VDD) for all releases.

User Documentation

The UDG provides complete, accurate, and user-friendly manuals for both soldiers and FSSS Engineers who use CECOM-supported ASAS systems. They also provide written materials and input for process improvement to each System Manager and other Electronic Warfare (EW) support Task Managers. The ASAS family of systems documentation includes Functional User Manuals, Software User's Manuals, and FSSS Engineer's Guides and is available in both hard and soft copy, as well as online.

Regional Software Support Activities



Once all the development, integration, QA, and testing activities have been completed, the software baseline is pre-positioned at worldwide FSSS Regional Software Support Activities (RSSA). Pre-positioning of software allows the FSSS Engineers the opportunity to install the baseline on systems in a non-operational environment and conduct operator and System Administrator (SA) training assessments.

Upon issuance of a CECOM load directive, the software baseline is loaded onto the fielded systems and brought into the operational arena. Generally, the ASAS Software Engineering Teams strive to deliver two releases per year.

Summary

Today's battlefield commanders must balance the need to confront modern enemies and prepare for tomorrow's enemies. CECOM SEC IFS provides life cycle software support to help the commander meet these requirements. CECOM SEC IFS has successfully provided Depot Operations support in software development, modifications and enhancements, test, documentation, and CM. The CECOM SEC IFS' professional staff helps the Warfighter meet the current needs while preparing for tomorrow.

For additional information or support, contact the IFS at:

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Written by Mr. William Walker, CECOM SEC IFS

PM/ACS and SEC Provide an Innovative Training Solution for Guardrail Common Sensor Systems

Take one highly complex system, provide upgrades to various components periodically, and sometimes add whole new subsystems. Shuffle the operators and maintainers around among various IEW Systems. What do you get? A training nightmare that GRCS operators, maintainers and support personnel have to deal with daily.

As new additions or modifications are introduced, New Equipment Training (NET) occurs, of course. However, even under optimal conditions, only approximately 80% of what first-generation students/soldiers learn from the NET is ever passed on to the next generation a year or two later (sometimes a matter of only months later). It is clear to see that it does not take long for even the best of training to deteriorate down to the bare minimum required to "get the job done". After a period of time, soldiers become unfamiliar with - sometimes totally unaware of - some of the more robust features and functions of a system/subsystem that could aid them tremendously in providing a better product.

Add to this picture the fact that the typical NET training provided is centered on demonstrating "what the system can do", not "what the soldiers must do"! This approach works well for the soldier-maintainers, but means that the soldier-operators are left on their own to disassemble the training material and reassemble it into something that is more task-oriented and more in line with their Mission Essential Task List (METL).

The Traditional Answer

The traditional approach to developing training is to study the situation, determine what needs to be trained and how best to train this, and then gather the necessary knowledge and skills data needed to construct a training course to cover these deficiencies. This may involve considerable travel-related expenses (and time) for the Instructional Design personnel to see the systems and interview the operators and supervisors first-hand. Then the actual development of the training course is accomplished, delivered and introduced. Post-training analysis is needed to fine-tune the training for maximal effectiveness. This entire process requires many

months, and if the system is modified in the mean time, one must begin again to capture these modifications or deliver an outdated trainer.

Computer-Based Training (CBT) and the sub-field of Web-Based Training (WBT) provide a more timely means of both development and distribution. However, most of the items produced in this realm are necessarily stand-alone programs or applications that require rebuilding or recompiling after modification. This means there is no way for the GRCS-equipped units to maintain this on their own.

ET Phase I, a multi-media WBT approach, started in the summer of 1998 and was delivered in March of 1999. This was done as a prototype and demonstration to determine if this medium could be both beneficial and well received by the soldiers. Based on a successful Phase I demonstration, additional funding was secured for Phase II.

However, moving the program from a Phase I prototype to a full-blown Phase II operational ET system brought with it a number of challenges. Although these were expected, it was decided that a new, more cost-effective and dynamic approach would be required for Phase II, and to coordinate and manage further development, PM ACS established the ET Integrated Product Team (IPT).

How to Resolve This Dilemma?

The IPT had to establish a broad curriculum, provide training to support that curriculum, provide the GRCS units with a training system that they could manage themselves, and replace the aging and partially dismantled Guardrail training equipment located at the United States Army Intelligence Center and School (USAICS) in Ft. Huachuca, AZ. All of this needed to be accomplished while utilizing pre-existing components and industry software and tools.

Phase II of the ET plan began in the summer of 1999 with a whole new approach. PM ACS provided the funding to SEC and their prime support contractor, with the required greater oversight and direction to be provided by the ET IPT, chaired by the Assistant Program Manager (APM) for Fielded Systems, of which the SEC GRCS Branch Chief is a member. SEC would lead the development, with portions sub-contracted out to small specialty companies as needed.

The equipment and material at USAICS needed updating desperately and this was the first situation addressed and accomplished. The outdated equipment was upgraded with training suites containing a modified version of the Phase I training material that was now realigned with the new curriculum. The existing USAICS training material was enhanced and also made available on the new training suites. USAICS will continue to receive all future updates as additional content is developed.

The ET Team turned the entire process around and focused instead on the student/soldier who would be on the receiving end of this training, rather than on the equipment that is being trained. The Overarching Curriculum - the driving force behind the entire ET project that defines not only tasks, but also task hierarchy and course definition - was developed with the operational tasks function based and the maintenance tasks equipment based. These tasks were created from existing materials - unit METLs, Job Books, Soldiers Manuals, etc. - and consolidated into a task and course listing that is applicable to the GRCS family of systems. The tasks are arranged into courses designed for the newly arrived soldier (Basic) and the more GRCS

experienced (Advanced), each with their own subcourses. The curriculum was then presented to instructors and staff at USAICS for verification of accuracy and suitability.

In keeping with this backward engineering philosophy, the student interface was created next. The look-and-feel was designed to be intuitive and minimal, yet informative, with a wide variety of multi-media aspects to ensure interactivity and to spark interest, thereby maximizing retention. But what about the training content? How do we get the content into these blank pages?

The ET Development Team realized that, as with almost all training, the words that appear to the students originates with a Subject Matter Expert (SME). SMEs are normally interviewed or complete a survey that extracts information used to compile the training material. The team asked itself, "If we are delivering the training via the Web, why not collect it via the Web, thereby virtually eliminating the need for travel and further reducing development costs?". So, instead of placing the bulk of the Instructional Design effort after the data collection, an online series of questions were created and the resultant answers mapped to specific places on specific pages. This GRCS Knowledge Repository, as it came to be known, was then fully developed, including standardized collection and presentation. Standardizing the collection leads to ever-decreasing time online for answering questions. This is because the SME's become more and more familiar with the process, which is repeated for each assigned task, and so are able to begin to anticipate the next question. Standardizing the presentation allows the soldier-student to become accustomed to where each particular aspect of the training, help and navigation features may be found for any given page. Thus the flow through the training material becomes natural and does not detract from the learning experience.

The answers provided by the SME are verified by another SME (from the same or similar system) for accuracy and to capture any small difference between system versions. The Instructional Designers then take over and edit the actual training presentation pages for clarity and to describe any multi-media (graphics, animations, narration, etc.) items that may be suitable for a given page. These multi-media items are then produced and attached to the pages. Each answer, page layout, multi-media application and answer-to-page map are stored in the Training Management System (TMS) for delivery.

The TMS provides the unit-training manager with the ability to create user accounts, assign pre-defined courses, create custom courses from the tasks available and to extract reports on the status/progress of students. The TMS even permits the units to create their own test questions (customized for their particular unit) and add them to the database for utilization.

Testing… Testing… 1-2-3!

This leads to development of an approach for how to best test the effectiveness of the training material. There is no substitute for actual hands-on application and testing. Thus, the development team started upgrading the rudimentary GRCS simulation mode into something more robust and less proprietary and the GRCS Scenario-Based Training Program was born.

The ET Team is currently constructing an aircraft simulator that uses a DoD-standard scenario generator to represent both threat and friendly assets. The data provided by the scenario is enhanced to stimulate the GRCS ground components such that the operators can hardly differentiate between a live or

simulated mission. The next phase of this project will even incorporate activity coordinated, target-language audio providing enhanced realism for the linguists.

Where to From Here?

SME data collection and courseware production are underway. The TMS is scheduled for completion in January '01. The first unit delivery of the Phase II training suites and new courseware is set for March '01. Suite installation and courseware delivery for the remaining systems and sites will be coordinated with the receiving units so as not to conflict with their current schedules.

Future system upgrades will have their accompanying training incorporated into the ET TMS for retention and sustainment training by the units. Future enhancements to ET call for the introduction of audio into the simulation mode, conversion of all remaining Technical Manuals to electronic format for ease of updating and convenience to the soldiers, and truly embedding the courseware into the operator workstations. Possible enhancements to the Scenario-Based Training include simulated fault injection for improved maintenance training.

The Embedded Training Development Team - the PM ACS, SEC, the IPT and contractors - have solved a problem that has plagued GRCS units and support personnel for years and created a system whereby training is always available to the soldiers, is constantly updated and is capable of growing with the systems.

Written by Mr. Benjamin Polanco, SEC, Guardrail Branch

ARAT-TA "Away Teams" – They're Still Working

The ARAT-TA periodically sends a small contact team, known as an "Away Team", to an Aviation unit to enhance understanding and effective employment of Army-Lead Target Sensing Systems (ATSS). Because of the cost involved, "Away Teams" usually travel to units with large concentrations of aviators, often because an Electronic Warfare Officer (EWO) has initially contacted ARAT-TA or CECOM SEC, and followed up with a Command's formal request. One or two "Away Teams" make it to the field each year – which is about as much as resources permit. The philosophy of the "Away Team" is the more contact with "the real world," the better the ARAT can support operations.

The year 2000 has seen an interesting mix of "Away Team" trips. In April, Mr. Pete McGrew and Mr. Jim Harrison headed west on Interstate 10 to the 4th Squadron, 2nd Armored Cavalry Regiment, Ft. Polk, LA. CW2 Scott Brusuelas, an EWO in the 4th Squadron, requested that the ARAT-TA provide aviators with awareness briefings on Aircraft Survivability Equipment (ASE), ARAT support capabilities, demonstrations of the Multi Service Electronic Warfare Bulletin Board (MSEWBBS), and electronic reprogramming procedures.

The "Away Team" visit was typical with three sessions provided: one for pilots, one for maintenance personnel, and one tailored for the Commander and his staff. The turnout was great, totaling almost 100 attendees. And, while later assisting the EWOs with troubleshooting a STU/MSEWBBS connectivity problem, the team discovered an issue important to establishing MSEWBBS connectivity - STU-to-STU voice

communications work fine over digital communications lines, but an analog line is required to enable STU-to-STU data transfer.

June saw another "Away Team" on I-10 again, but this time it was eastbound to Jacksonville, FL. This was not a typical "Away Team" visit, as there were no briefings involved. The 1-111th Attack Helicopter Battalion's EWO contacted the ARAT-TA requesting assistance in reprogramming the AN/APR-39A(V)1 Radar Signal Detecting Set (RSDS) on the unit's aircraft. With an operational deployment imminent, the unit had been unable to obtain all equipment required for RSDS electronic reprogramming. Although the unit EWO was TDY, Avionics NCOIC SSG Pat Blutcher and SGT Chris Sanchez served as our hosts.

These resourceful NCOs had retrieved a discarded (and ancient!!!) laptop computer from a disposal bin, and had repaired it just prior to our arrival. We helped them install the Memory Loader/Verifier (MLV) Version 1.14 application and EWOSS2000 reprogramming software, and provided a brief demonstration of each reprogramming method. SSG Blutcher and SGT Sanchez used their laptop with the MX-9848/APR-39 Test Bench and reprogrammed several User Data Modules (UDMs). Reprogramming was a "piece of cake" for these Avionics specialists, despite using a laptop that probably belonged in the Smithsonian.

Bottom line for this visit – the unit had all 13 operational UDMs reprogrammed less than one hour after our arrival. We also assisted EWO CW2 Briggs, Det 1, 189th Aviation (AVN), Idaho ARNG, on TDY to Jacksonville, in configuring his laptop for reprogramming use. Finally, this team provided both units with CD-ROMs containing ASE awareness materials for use in unit Electronic Warfare/ASE refresher training. This "Away Team" had a different focus than most, yet resulted in two units gaining full capability for electronic reprogramming.

In our office, "targets of opportunity" are normally authorized when resources are available. For example, in August, CECOM SEC sent Mr. John Amoretti and Mr. Mike Crapanzano, along with Mr. McGrew, as the ARAT-TA representative, on a technical assistance team to the 3rd Military Intelligence (MI) Battalion (Bn) in Korea. The team's primary goal was to troubleshoot anomalies on installed ASE. Mr. McGrew and Mr. Amoretti logged nearly 80 hours of flight time in a seven-day period of flight tests. The flight tests were very successful, and resulted in improved MDS development and programming techniques that will be incorporated in all future AN/APR-39A(V)1 MDS.

When not flying or preparing to fly during this trip to Korea, team members conducted four sessions of ASE/ARAT awareness briefings and MSEWBBS familiarization training to aviators and aircraft maintainers of the 3rd MI Bn and the 2-52nd AVN Regiment. For more information on this particular trip, see the October 2000 edition of the "A/IEW Bulletin".

When not on the road, members of the ARAT-TA, on a monthly basis, provide ARAT introductory briefings at Ft. Rucker's ASE/EWO Course. This is the ideal forum for us to introduce the ARAT to new EWOs and ASE users; each year we reach over 300 aviators in these classes.


The ultimate goal of any "Away Team" visit is to put reprogramming skills in the hands of the soldiers.

The tasks listed above may seem minor when compared to the field activities of a typical aviation unit, but they represent a significant "additional duty" for the analysts and engineers in ARAT-TA. Preparation for every trip requires detailed threat research in both classified and unclassified sources. All hardcopy briefings and handouts are unclassified. Therefore, Threat Analysts, such as Mr. Roy Williams, conduct extensive searches in reputable sources that may include *Jane's*, *Periscope*, *Aviation Week*, *Defense Weekly*, *FBIS*, *Military Balance*, etc. Much information suitable for training purposes on current threat systems and political conflicts is obtained from open sources. Relevant information is then integrated into our Threat Awareness/ASE presentations, thereby keeping the briefing up-to-date, tailored to the audience, and credible. Mr. Williams and the other analysts and engineers perform parallel tasks in the classified environment to get the latest data on system capabilities, orders of battle and similar information. Our unit presentations, therefore, must be given in facilities cleared for classified data to allow for detailed discussion of specific threats.

After all, if aviators don't fully understand how ASE works and train properly with the equipment, they won't be able to reap the ASE benefits when they need them. By launching the "Away Team" as often as possible, ARAT-TA simultaneously improves its own knowledge base and capabilities while directly supporting the Warfighters. We look to continue "Away Team" unit visits in the coming year.

Written by Mr. Roy Williams and Mr. Jim Harrison, SRI International at ARAT-TA, Eglin AFB, FL


Mr. Pete McGrew on the flightline in Korea.

SEC and LRC Resolve Intercept Management Subsystem (IMS) Audio Issues

The CECOM Software Engineering Center (SEC) A/IEW Guardrail Branch was faced with a major dilemma. The CECOM Logistics Readiness Center (LRC) IEW Division identified a problem in maintaining and supplying Digital Temporary Storage Recorders (DTSRs), for fielded Guardrail Systems, because of obsolete technology and lack of adequate spares. What do you do with failing antiquated equipment that is no longer being supported by the Government or industry, but still plays a vital role in today's Army? This was a tough question, but one that SEC's engineers were able to answer with an innovative software solution.

With the cooperation and support of CECOM LRC, the concept of an improved audio processing capability, the Intercept Management Subsystem (IMS), was postulated, studied and designed, and is now in the final stages of development. IMS provides enhanced audio processing functionality for the Guardrail family of systems. The concept behind the IMS operations is to combine portions of the GRCS-1 Datalink Programmable Adapter Module (PAMs), Audio Management System (AMS) and Special Signals Processing (SSP)

components, or a combination of the GRCS-4 Datalink Demux, DTSRs, Audio Bus Controller (ABC), Cassette Recorder, AN/TNH-25 (Recorder/Reproducer) and Operator Audio Interface (OAI) components. The IMS is an open architecture ready to accept third party SSP solutions. It is compliant with the Joint Technical Architecture (JTA), contains no proprietary hardware or software, and provides a platform for continued and scalable growth. This development effort is critical to the intelligence needs of the European Theater of Operations, as GRCS-4 has been the corner stone of COMINT and ELINT tactical intelligence since its deployment in 1991. Time and technology have marched on while GRCS-4 carried forward its mission, and as a result the audio recording equipment in the system has failed and is no longer sustainable.

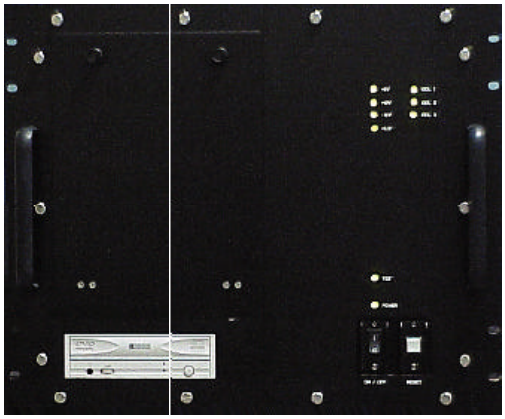
The IMS consists of five Computer Software Configuration Items (CSCIs): the Workstation Interactive Graphical Interface (WIGI), the Workstation Audio Controller (WAC), the Intercept Management Processor (IMP) server, the Intercept Database Server (IDBS), and the MSC Interface Agent (MIA).

The WIGI is a Web/Java-based open architecture interface that is reusable on other JTA-compliant platforms. Providing that a sufficient communication paths exist between the Integrated Processing Facility (IPF) and the remote workstation, the WIGI is capable of displaying information about the audio being received in real time to a user located anywhere in the world, regardless of the IPF's location and user workstation platform. The WIGI, when used with the WAC, is capable of controlling and manipulating audio streams during playback and interacting with COTS products. As the IMS system advances, new SSP tools will be added to the IMP. These SSPs will be controlled by the WIGI. Through the use of the WIGI, users are able to control the archive and retrieval of the audio segments, as well as associated parametric data. The WIGI also provides users with transcription and gisting capability. The Interface retains all the functionality currently available, yet provides those functions in a manner that is meaningful to the user and takes advantage of the new capabilities employed in the IMS.

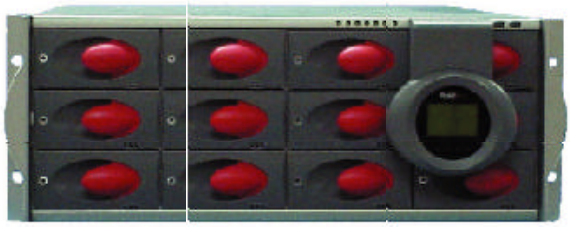
The WAC is used to control and manipulate all audio that is routed through the workstation, replacing the Operator Audio Interface (OAI) in GRCS-4. It serves as the interaction between the IMS and the user by providing real-time audio streams and archived playback segments from the IMS, converting the audio stream from digital to analog using Audio CCA and providing playback. The WAC interacts with the WIGI in order to display the audio information in a manner that is meaningful to the user. Hardware components consist of a full duplex soundcard and a headset. The WIGI and the WAC will make use of existing user workstations and will only require the addition of more memory to the PC.

The IMP server is designed to fully support audio management capabilities. As audio is collected, it is separated into two groups. Dead air space is discarded, and audio signals are automatically recorded and the associated data sent to a database, in addition to the user's WIGI. The signal is then routed through multiple SSP algorithms where additional associated data is linked with the audio signal and sent to the database and the WIGI.

The user may, at any time, protect a segment of the audio signal for transcription or archival purposes with the IMP providing an approximate total of 1000 hours of recorded storage space. The IMP prioritizes auto-overwrite of non-referenced recordings and will also serve a playback request to the user of one or many audio segments in the order specified. The IMP is also responsible for recording user's annotations, and is capable of recording 96 input audio channels and 48 output audio channels simultaneously. This capability, in conjunction with the new SSP algorithms, will provide for a more robust Prioritized Audio Monitoring and Recording (PAM/PAR) capability. The IMP employs a flexible, expandable, open, and COTS-based architecture so that all external interfaces can be quickly, and with minimal funding, reconfigured to reflect any future source interfaces.



Intercept Management Processor



Audio Storage Device

The IDBS component is used for the storage of all data associated with each audio segment recorded and/or protected, provides specific identifiable information for the recall of audio segments located on the IMP, and is responsible for interacting with each WIGI. The IDBS also interfaces with the IMP to receive some of the associated data that is generated from the receivers. It is capable of providing data in a multitude of query options to the user's interface upon request, and in a way that is viewable via a web browser that can easily be ported into a report for transcription purposes. The IDBS' hardware components consist of the existing equipment (i.e., SPARC 1000 and SPARC Storage Array Model 100). It is scalable in design to allow for future data elements and system growth.

The MIA is the principle agent bridging the older proprietary architecture of the GRCS-4 with the new open Intercept Management System. The MIA serves as an interface agent to convert the serial based interfaces of the MSC to a LAN based interface used by the IMS. Utilizing a RS232 serial cable, the MIA routes information to the designated system via TCP/IP socket interfaces while maintaining a serial connection with the MSC. A TCP/IP interface component serves to communicate with the IMS via FDDI. The MIA provides data and real-time status updates through these interfaces.

The IMS suite is well suited for use in all existing Guardrail Common Sensor systems and the Guardrail Relay Facility (GRF), as well as the future SIGINT and IMINT Processing Facility (S&IPF) and Aerial Common Sensor (ACS) systems. The IMS is another example of SEC's Technology Insertion initiatives, providing new functionality while extending the longevity of a critical Army system. The IMS architecture is designed to accommodate any type of workstation hardware, and all components are commercially available from multiple vendors. SEC, *"The Recognized DoD Software Leader, From Desktop to Foxhole,"* is leading the way to the new software frontier!

Written by Mr. Lazaro Alfonso, SEC, Guardrail Branch

For Your Information

Coming Events!

Event	*Location*	*Date(s)*
AUSA Winter Symposium & Exhibition	*Greater Ft. Lauderdale/Broward County Convention Center, FL*	*28 February-2 March 2001*
TechNet Tampa 2001	*Tampa, FL*	*13-14 March 2001*
AAAA Annual Convention	*Charlotte, NC*	*4-7 April 2001*

Now Available on the Web

All 21 previous issues of the "ARAT Bulletin" and the "A/IEW Bulletin" are now available on the ARAT web site. The issues are available in HTML format for on-line viewing, as well as in PDF and MS Word 97 format for viewing and downloading.

Future issues will also be posted on the site and in the same format. You are encouraged to download any issue (or issues) for local reproduction and distribution within your agency.

The ARAT web site can be accessed at http://arat.iew.sed.monmouth army.mil/, or from a link on the A/IEW web site at http://www.iew.sed.monmouth.army.mil/.

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Electronic Warfare Officers requiring Memory Loader/Verifier (MLV) reprogramming kits, copies of the "ARAT Software and Documentation Toolbox" CD or the "Mission Data Set Training" CD should contact either Ms. Fanny Leung-Ng (DSN: 312-992-1859/ CML: 732-532-1859) (fanny.leung-ng@mail1.monmouth.army.mil) or Ms. Tara Hurden (DSN: 312-992-5319/ CML: 732-532-5319) (tara.hurden@mail1.monmouth.army.mil) or fax your requests to DSN: 312-992-8287/5238 or CML: (732) 532-8287/5238.

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